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SHEET

O/ECT: 33727.1.1

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 33727.1.1 (B-4490)

COUNTY CUMBERLAND

PROJECT DESCRIPTION BRIDGE NO. 116 OVER CSX RR, NORFOLK

SOUTHERN RR, & HILLSBORO ST. ON NC 24-210

SITE DESCRIPTION BRIDGE ON -L- OVER NORFOLK SOUTHERN

RR @ -L-STA. 35+23

N.C. 33727.1.1 (B-4490) 1 10

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FILED BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

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PERSONNEL **S&ME, INC.**

J.R. SWARTLEY

O.B. OTI

H.R. CONLEY

J.R. MATULA

INVESTIGATED BY J.R. SWARTLEY

CHECKED BY N.T. ROBERSON

SUBMITTED BY N.T. ROBERSON

DATE JUNE 2014



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NOTE - BY HAVING REQUESTED THIS INFORMATION THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS
FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE
CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PROJECT REFERENCE NO. 33727.I.I (B-4490) SHEET NO.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

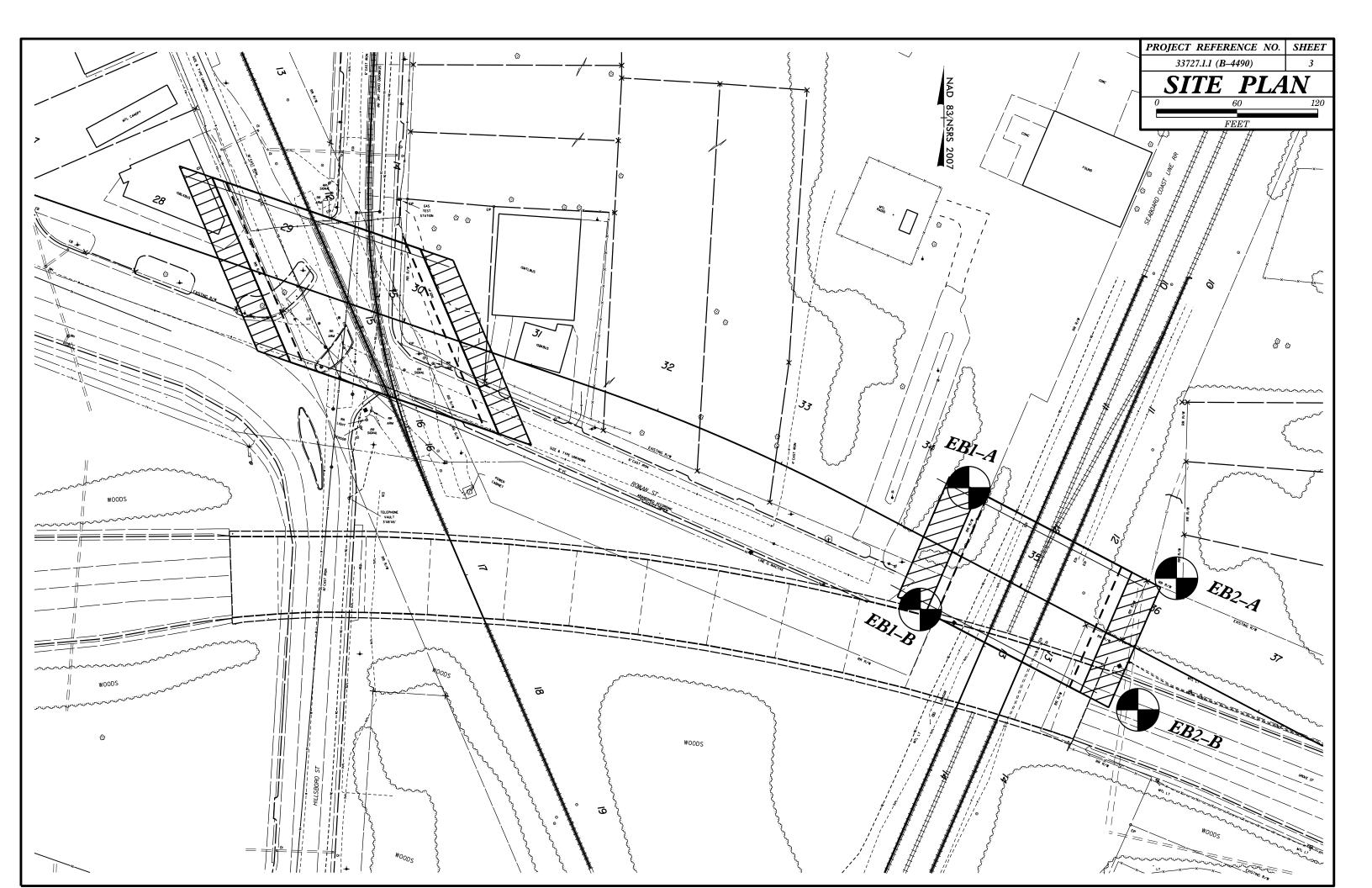
DIVISION OF HIGHWAYS

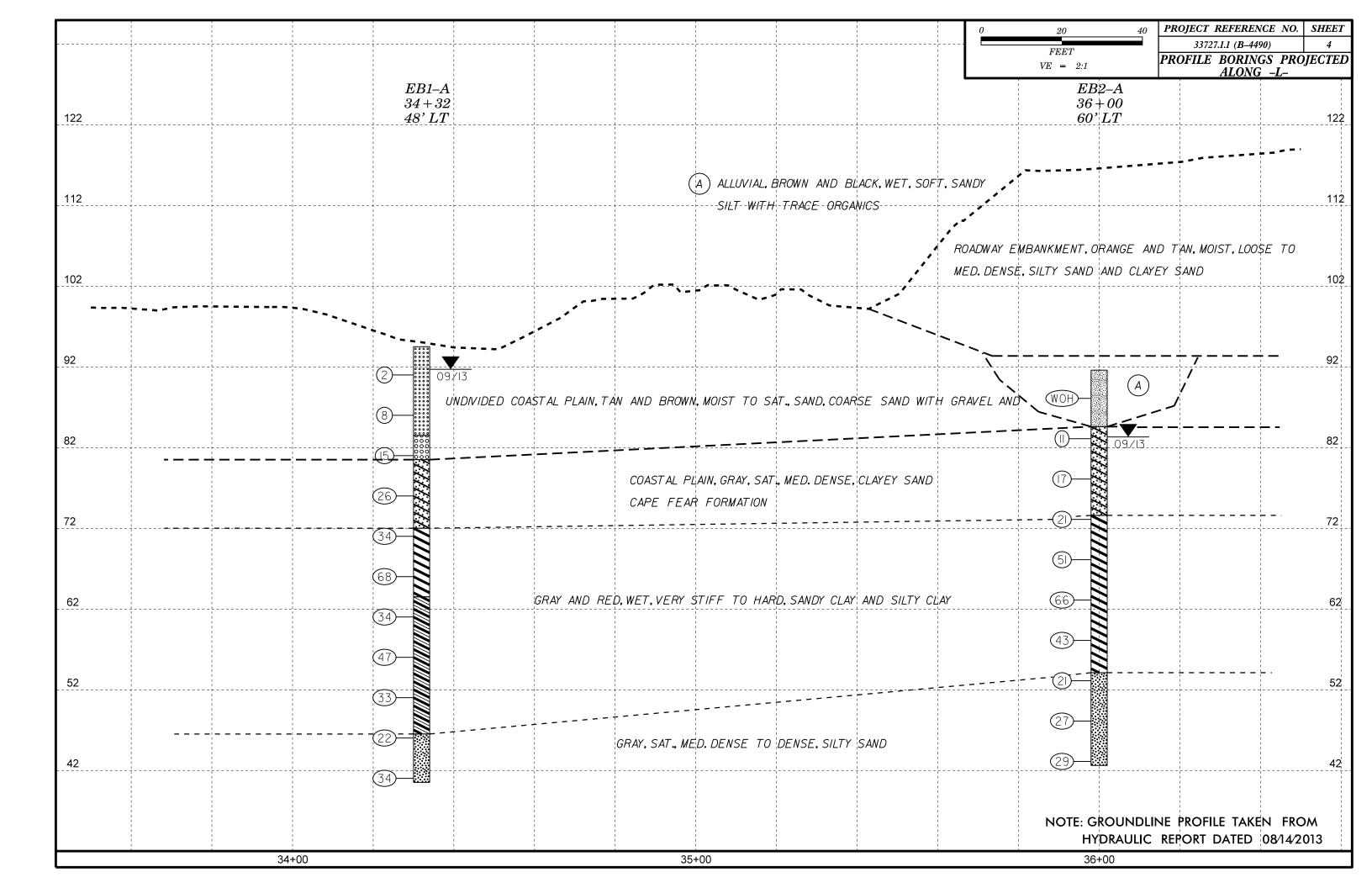
GEOTECHNICAL ENGINEERING UNIT

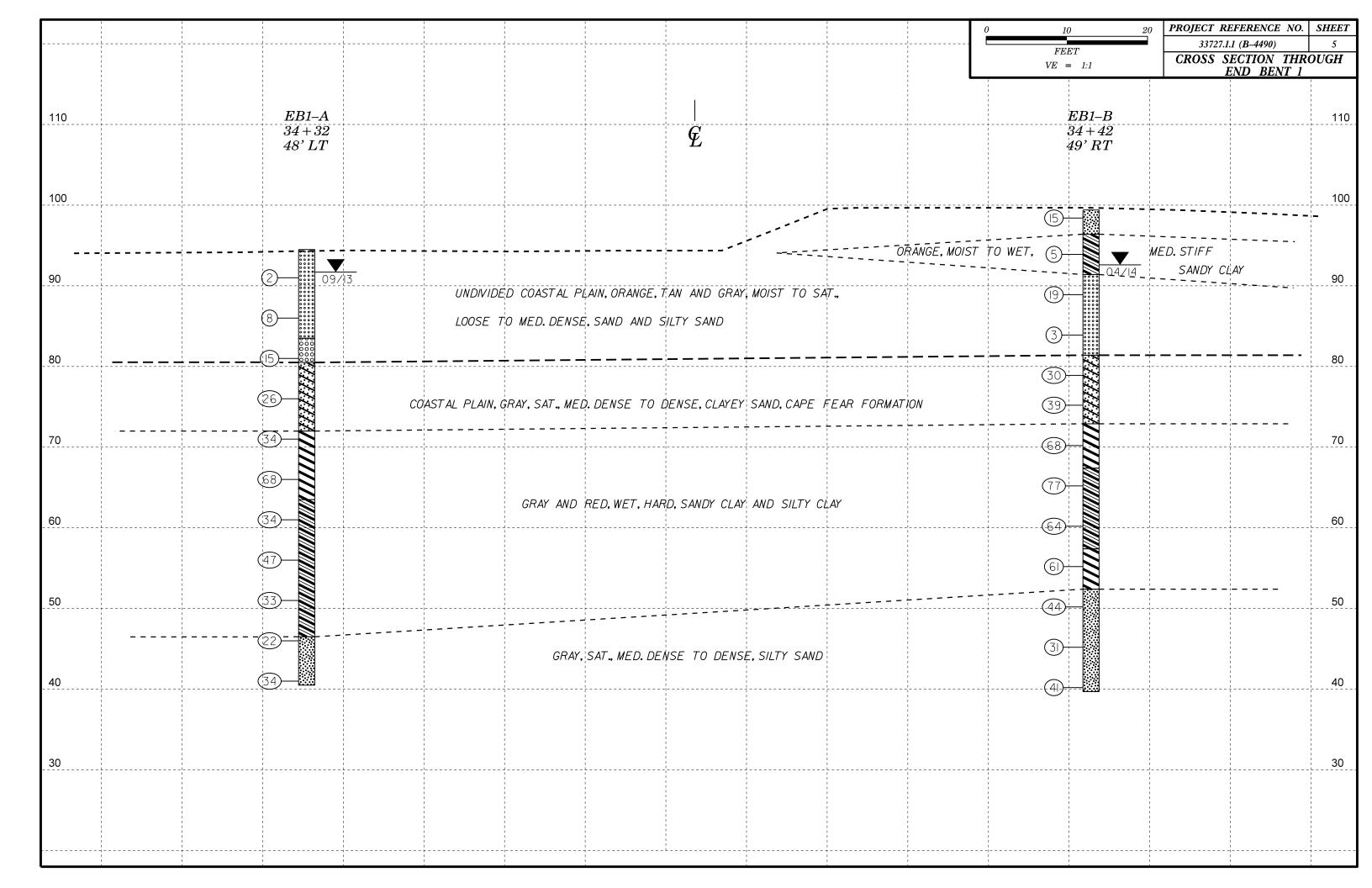
SUBSURFACE INVESTIGATION

SOIL AND BOCK LEGEND TERMS SYMBOLS AND ARRESTIATIONS

	SOIL AND ROCK LEGEND, TERM	S, SYMBOLS, AND ABBREVIATIONS	
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO 1206, ASTM D-1586). SOIL	POORLY GRADED) GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.	SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE	AQUIFER - A WATER BEARING FORMATION OR STRATA.
CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS,
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: VERY STIFF, GRASSILTY CUR, MOST WITH INTERBEDDED FINE SAID UNERS, HIGHLY PLASTIC, A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100	OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.
SOIL LEGEND AND AASHTO CLASSIFICATION	MINERALOGICAL COMPOSITION	ROCK (WR) BLOWS PER FOOT IF TESTED.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS	CRYSTALLINE ROCK (CR) FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE,	GROUND SURFACE.
CLASS. (\$\leq 35% PASSING \(^200\)) (> 35% PASSING \(^200\))	WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE. COMPRESSIBILITY	ONEISS, GABBRO, SCHIST, ETC. NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SCHIMENTAGE PROFIT THE TO THE PROFIT OF	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5 A-6 A-7 A-1, A-2 A-4 A-2, A-5 A-6 A-2, A-6 A-7 A-1, A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-6 A-7 A-1, A-1 A-1, A-2 A-6 A-7 A-1, A-1 A-1, A-2 A-	SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31	ROCK (NCR)	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
SYMBOL 000000000000000000000000000000000000	MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL
Z PASSING SILT-	PERCENTAGE OF MATERIAL	(CP) SHELL BEDS, ETC. WEATHERING	LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
# 40 39 MX CLAY PEAT	ORGANIC MATERIAL GRANULAR SILT - CLAY SOILS SOILS OTHER MATERIAL		ROCKS OR CUTS MASSIVE ROCK.
= 200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN 36 MN	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE.	<u>DIP</u> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
LIQUID LIMIT 48 MX 41 MN 48 MX 41 MN 48 MX 41 MN 48 MX 41 MN 48 MX 19 MX 11 MN 11 M	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF
PLASTIC INDEX 6 MX NP 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN LITTLE OR GROUP INDEX 0 0 0 4 MX 8 MX 12 MX 16 MX No MX MODERATE ORGANIC	HIGHLY ORGANIC >10% >20% HIGHLY 35% AND ABOVE	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.	THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
HIGHAL TYPES STONE SPACE	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
OF MAJOR GRAYEL, AND SAND GRAYEL AND SAND SOILS SOILS MATTER	STATIC WATER LEVEL AFTER 24 HOURS	CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
GEN. RATING	→ STATES TO THE	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.
AS A EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE SUBGRADE	Land to the state of the state	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY
PI OF A-7-5 SUBGROUP IS ≤ LL - 30; PI OF A-7-6 SUBGROUP IS > LL - 30	SPRING OR SEEP	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL	THE STREAM.
CONSISTENCY OR DENSENESS RANGE OF STANDARD RANGE OF UNCONFINED	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION, ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK, ROCK GIVES "CLUNK" SOUND WHEN STRUCK.	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY PENETRATION RESISTENCE (N-VALUE) (TONS/F12)	ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION ROADWAY EMBANKMENT (RE) PET DMT TEST BORING W/ CORE	IF TESTED, WOULD YIELD SPT REFUSAL	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
GENERALLY VERY LOOSE <4	SOIL SYMBOL AUGER BORING SPT N-VALUE	SEVERE (SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
GRANULAR LUUSE 4 TO 10 N/A	- Soil Simbol	EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED, YIELDS SPT N VALUES > 100 BPF	ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
MATERIAL (NON-COHESIVE) DENSE 30 TO 50	ARTIFICIAL FILL (AF) OTHER ————————————————————————————————————	VERY SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN
VEDY COST	INFERRED SOIL BOUNDARY MONITORING WELL	(V SEV.) THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR	SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN
GENERALLY SOFT 2 TO 4 0.25 TO 0.50	INFERRED ROCK LINE A PIEZOMETER	VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. IF TESTED, YIELDS SPT N VALUES < 100 BPF	INTERVENING IMPERVIOUS STRATUM.
MATERIAL STIFF 8 TO 15 1 TO 2	INSTALLATION TTTTT ALLUVIAL SOIL BOUNDARY SLOPE INDICATOR	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS, SAPROLITE IS	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4 HARD >30 >4	25/025 DIP & DIP DIRECTION OF	ALSO AN EXAMPLE.	ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND
TEXTURE OR GRAIN SIZE	ROCK STRUCTURES CONE PENETROMETER TEST	ROCK HARDNESS	EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	◆ SOUNDING ROD	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	PARENT ROCK.
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	ABBREVIATIONS	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY, HARD HAMMER BLOWS REQUIRED	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST	TO DETACH HAND SPECIMEN. MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE	TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
(BLDR.) (COB.) (GR.) (CSE. SD.) (F SD.) (SL.) (CL.)	BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY 7 - UNIT WEIGHT	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
GRAIN MM 305 75 2.0 0.25 0.05 0.005 SIZE IN. 12 3	CPT - CONE PENETRATION TEST NP - NON PLASTIC $\dot{\gamma}_d$ - DRY UNIT WEIGHT CSE COARSE ORG ORGANIC	BY MODERATE BLOWS. MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF
SOIL MOISTURE - CORRELATION OF TERMS	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST <u>SAMPLE ABBREVIATIONS</u>	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.	A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER, SPT REFUSAL IS PENETRATION EQUAL TO OR LESS
SOIL MOISTURE SCALE FIELD MOISTURE GUIDE FOR FIELD MOISTURE DESCRIPTION	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS	THAN 0.1 FOOT PER 60 BLOWS.
	F - FINE SL SILT, SILTY ST - SHELBY TUBE FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY (SAT.) FROM BELOW THE GROUND WATER TABLE	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE
PLASTIC	FRAGS FRAGMENTS ω - MOISTURE CONTENT CBR - CALIFORNIA BEARING HI HIGHLY V - VERY RATIO	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.	TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
RANGE - WET - (W) SEMISULIU; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	EQUIPMENT USED ON SUBJECT PROJECT	FRACTURE SPACING BEDDING	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
PLL PLASTIC LIMIT	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	TERM SPACING TERM THICKNESS VERY THICKLY BEDDED > 4 FEET	BENCH MARK: BL-6, -L- STA., 33+08.21, 68.94' RT
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	AUTOMATIC MANUAL	WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET	N: 476596.7086 E: 2034898.9756 ELEVATION: 98.90 FT.
SL SHRINKAGE LIMIT	MOBILE B- CAT BITS CORE SIZE:	MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.03 - 0.16 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET	
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	BK-51	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET	NOTES:
PLASTICITY	CME-45C HARD FACED FINGER BITS -N	INDURATION	
PLASTICITY INDEX (PI) DRY STRENGTH	TUNGCARBIDE INSERTS	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
NONPLASTIC 0-5 VERY LOW LOW PLASTICITY 6-15 SLIGHT	CME-550	FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
MED. PLASTICITY 16-25 MEDIUM	PORTABLE HOIST TRICONE STEEL TEETH POST HOLE DIGGER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE;	
HIGH PLASTICITY 26 OR MORE HIGH COLOR	TRICONE TUNG,-CARB. HAND AUGER	BREAKS EASILY WHEN HIT WITH HAMMER.	
	CORE BIT SOUNDING ROD	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE: DIFFICULT TO BREAK WITH HAMMER.	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.	VANE SHEAR TEST	EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE:	
		SAMPLE BREAKS ACROSS GRAINS.	
			REVISED 09/23/09







		1	<u> </u>	1			20 40	PROJECT REFERENCE NO	O. SHEET
							FEET $VE = 1:1$	33727.1.1 (B-4490) CROSS SECTION TH -L- STA 36+0	6 IROUGH 00
150		EB2-A			EB2	+B			150
		36+00 60° LT		\mathcal{L}	36+ 40' I	RT			
130						 			130
	(A) ALLUVIAL, BROWN AND BUT SANDY SILT WITH TRACE	1	WET.VERY SOFT,	, -	ROADWAY (2	EMBA	VKMENT,		
110		;	T.LOOSE TO MED.DENSE,	MOIS7	ORANGE AND TAN	Ł00SEī	O-MED. DENSE, SILTY-SAND-		110
	SILTY SAND AND CLAYE	Y SAND			AND 9—1	CLAYE	SAND		
90	B	WOH	09/13 A - UNDIVIDED COA	— — — — — STAL PLAIN, TA	AN AND BLACK, MOIST	TO SAT., LO	SE TO MED. DENSE, SILTY		90
		· – – –	<<			SAND WITH	TRACE ORGANIC MATTER		
70	COAST AL PI	_A/N,	GRAY, SAT.,	MED.DENSE T	O VERY DENSE, 63	CLAYEY SAND	, CAPE FEAR FORMATION		70
- 70	GRAY	(S)—(B)—(B)—(B)—(B)—(B)—(B)—(B)—(B)—(B)—(B	AND-RED,WET,VERY-	\$T1F-FT0-HAR	D, 44 87 	SAT, DENSE,			70
50		43-8		 ISET-0	(53)————————————————————————————————————		E, SILTY-SAND		50
		29—			34— GRAY, 48— GRAY, SAT,55— GRAY, 68—	WET., HARD, S	ANDY CLAY		
30					GRAY, (68) GRAY, (68) 64	WET., HARD, S	ANDY CLAY		30
10						 			10
		1							
-10						 			-10
-30		 		 		 			-30

WBS 33727.1.1	TIP B-4490		Y CUMBER				GEOLOGIST Oti, O. B.	_		WBS 33727				P B-4490		NTY CUMBE				GEOLOG	GIST Swartley, J		
SITE DESCRIPTION BR. ON	1) -L- STA. 35	+23				GROUNE	D WTR (ft)	SITE DESCR	RIPTION	BR. ON -		R NORFOLK SO		@ -L- STA. 3	5+23					GROUND	WTR (ft)
BORING NO. EB1-A	STATION 34+3		OFFSET 4	48 ft LT			ALIGNMENT -L-	0 HR.	N/A	BORING NO.	. EB1-B		S.	TATION 34+4	2	OFFSET	49 ft RT	Γ		ALIGNM	ENT -L-	0 HR.	N/A
COLLAR ELEV. 94.5 ft	TOTAL DEPTH	54.0 ft	NORTHING	476,6	45		EASTING 2,035,061	24 HR.	2.8	COLLAR EL	EV. 99.	4 ft	T	OTAL DEPTH	59.7 ft	NORTHIN	G 476,5	554		EASTING	G 2,035,025	24 HR.	6.8
DRILL RIG/HAMMER EFF./DATE				DRILL N	METHOD) Mud I	Rotary HAMM	MER TYPE /	Automatic	DRILL RIG/HAM	MMER EFF	./DATE SI	ME R-2 [DIEDRICH D-50 8	4% 11/01/2009		DRILL	METHO	OD N	/lud Rotary		HAMMER TYPE AL	ıtomatic
DRILLER Conley, H. R.	START DATE		COMP. DAT				SURFACE WATER DEPTH N/	/A		DRILLER C				TART DATE (COMP. DA			4	SURFAC	E WATER DEPT	ł N/A	
F F(/ P =: · · ·	7 COUNT E 0.5ft 0.5ft 0 25	BLOWS PER FOO ⁻	75 100	SAMP.	'/	0	SOIL AND ROCK DES	SCRIPTION .	DEPTH (ft)	ELEV DRIVE ELEV (ft)	DEPTH_ (ft)	0.5ft 0.5f	OUNT ft 0.5ft	0 25	LOWS PER FO	75 100	SAMP NO.	1/	O G		SOIL AND ROCK	DESCRIPTION	
95						(94.5 GROUND SURF		0.0	100	0.0	7 7								— 99.4 •••	GROUND		0.0
92.0 2.5	<u> </u>				lacksquare	0000	TAN AND BROWN				‡	' '	ľ	15 .				M		96.4	UNDIVIDED CO BROWN AND ORA	NGE, SILTY SAND	3 (
90 + '	1 1 2				M	0000				95 94.9	4.5		1	· /· · · ·			1	l			ORANGE, S	ANDY CLAY	
87.0 1 7.5						0000					‡	2 3	2	5 -				M	<u> </u>	*			
85 7.0 7.5 1	2 6 . 8				Sat.	0000				90 89.9	9.5			:					000	91.4	<u>G</u> RAY,	SAND	8.0
 							33.5		11.0	90 89.9 -	+ 9.5	3 9	10	19			1	Sat	t. 000				
82.0 12.5 2	6 9				Sat.		30.5		44.0		†			::/:: :					000				
80	1 415				Out.		GRAY, CLAYEY S	AIN	14.0_	85 84.9 -	14.5	3 2	1	42			+	Sat	000				
77.0 17.5						·///	(CAPE FEAR FORM	MATION)			<u> </u>								000	01.4			10 (
75 5	12 14	6		SS-18	Sat.	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\				80 79.9	19.5			.					*	<u>+</u>	COASTA GRAY, CLA	L PLAIN	10.9
	: : : : \					·//-					‡	7 11	19	::::[``	30		SS-13	3 Sat	t. 🔆	}	(CAPE FEAR	FORMATION)	
72.0 22.5 8	12 22	. √		SS-19	w		GRAY AND RED, SAND SILTY CLAY	Y CLAY AND	<u>22.5</u> D	76.2 75	23.2	12 19	20		Y			Sat		}			
 							SILTY CLAY	•		-	‡				39		1	Sal	. ///	72.9			26.5
67.0 27.5	34 34				w					71.2	28.2									<u>+ 12.9</u> — -	GRAY AND RED, S		20.
65 + 10 10		· · · · · · · · · · · · · · · ·	68		\ vv					70	‡	11 16	52			68	SS-14	4 W		*	SILIT	CLAT	
62.0 1 32.5							63.5		31.0		‡					$\cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot $				67.4			32.0
60 11 11	18 16	₹34		SS-20	w					65 66.2	33.2	17 25	52					l _w		<u>}</u>			
Ŧ											Ξl]			\{			
57.0 37.5 9	22 25				l w					61.2	38.2	13 26	38			:/: :::::				<u> </u>			
55		/.								60	‡	13 26	38			64	+	W		-			
52.0 42.5	12 21	/								50.0	43.2				: : : : :					57.4			42.0
50	12 21	33			W					55 56.2	+ 43.2	15 24	37		· · · j	1	SS-15	5 W		} _			
47.0 1 47.5	:::://										‡				::: //::					- 52.4			47.0
	9 13			SS-21	Sat./W		46.5		48.0	51.2	48.2	10 16	28	-				Sat		:- -	GRAY, SIL	TY SAND	
*											†				- / -		1						
42.0 52.5	14 20	24			Sat.		40.5		54.0	46.2	53.2				<u> </u>								
 	1 1 1 1 1 1 1 1 1	V 34			- Out.	<u> </u>	Boring Terminated at Elev DENSE SILTY S			45]	10 11	20		31		SS-16	Sat	t.				
						[DENSE SILTY S	SAND			<u> </u>												
										40 41.2	T 58.2	10 16	25		41			Sat	t.	_ 39.7			59.7
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47.0 47.5 9 42.0 52.5 12						F					<u> </u>									E			
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SHEET 8 OF 10

WBS	337	27.	.1.1			Т	IP B-4490		COUNTY	CUMBER	LAND			GEOLOGI	ST Oti, O. E	3.		
SITE	DESC	RI	PTION	BR.	ON -L	- OVE	R NORFOLK	SOUTHE	RN RR @	-L- STA. 35	+23						GROUI	ND WTR (ft
BORI	ING N	0.	EB2-	Ą		S	TATION 36	6+00		OFFSET	60 ft LT			ALIGNME	NT -L-		0 HR.	N/A
COLI	LAR E	LE	V . 91	.6 ft		T	OTAL DEPT	H 49.0 ft	:	NORTHING	476,5	77		EASTING	2,035,215		24 HR.	2.0
DRILL	. RIG/H	AM	MER EF	F./DAT	E RF	00074 0	CME-55 92%	7/12/2011			DRILL N	IETHOI	D Mu	d Rotary		HAMM	ER TYPE	Automatic
DRIL	LER	Co	onley, H	1. R.		S	TART DATE	09/12/1	3	COMP. DA	TE 09/	12/13		SURFACE	WATER DE	PTH N	A	
ELEV (ft)	DRIV ELE\ (ft)	ΈV	DEPTH (ft)	BL0	OW CC				PER FOOT	75 100	SAMP.	MOI	L O I G	1	SOIL AND RO	OCK DES	CRIPTION	N
	(11)	\dashv						1			1	Z IVIO						
٥.																		
95		_	_											- ·				
		‡	-											. 91.6		ND SURF		C
90			-									V		- BL	UNDIVIDED ACK AND GR			/ITH
	89.1	1	2.5	WOH	WOH	WOH					SS-22	w				ORGAN		
		1	_				[\frac{1}{2} : : : :							•				
85	84.1	\pm	- 7.5							1				_ 84.6		STAL PLA		
		7		3	6	5	. 11 .	: : : :	: : : :		SS-23	Sat.	\\\\	•	GRAY, (CLAYEY S	SAND	
80		7	-				::/::	: : : :	: : : :				·//	•	(CAPE FE	AR FORM	IATION)	
00	79.1	4	12.5	4	6	11	 		: : : :	1		Sat.		- ,				
		‡	-			''	17					Sal.	//	· ·				
75		. ‡	-				· · ·						//	-				
	74.1	+	17.5	7	10	11		 21			SS-24	Sat./W		<u>73.6</u>	GRAY	SILTYC		1
		1	_				:::::				0021	1			Order	OILITO	L) (1	
70	69.1	.]	22.5						ļ · · · · ·	+				-				
	00.1	7	-	11	21	30] : : : :	: : : .	2 51			w		•				
65		‡	-						\\					•				
00	64.1	4	27.5	14	25	144				1				-				
		1	_	14	25	41	::::			i	SS-25	W						
60		+	_						/									
	59.1	7	32.5	10	18	25						l w		-				
		‡	-									**		•				
55		. ‡	- 07.5					/	: : : :					- _{54.1}				9.
	54.1	1	37.5	7	10	11	- - - - - - - - -	∤ · · · · · · · · · · · · · · · · · · ·			SS-26	Sat./M	/	_ <u>54.1_</u>		SILTYS	AND -	3
		1	_				$[\cdot] : \cdot : \cdot : [\cdot]$	Ĭ : : : :										
50	49.1	1	42.5					\	1	1				_				
		7	-	11	13	14] ::::	27				Sat.		•				
45		‡	_					 						•				
70	44.1	4	47.5	7	12	17		1						- ·				
		4	-	 '	12	+ ''		•29			+	Sat.		42.6 Bo	ring Terminate	ed at Elev	ation 42.6	ft IN
		J	_											-	MED. DEN	ISE SILT	SAND	
		7	_			1							F					
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WBS	33727.1.1		TI	P B-4490		COUNTY	CUMBE	RLAND		GEOLOGIST Swarf	ley, J. R.			WBS 3372	7.1.1			TIF	P B-4490		COUNT	Y CUMBER	LAND		G	EOLOGIST Swartley,	J. R.		
SITE	DESCRIPTION	BR. ON -	OVEF	NORFOLK	SOUTHE	RN RR @	-L- STA. 3	5+23				GROUN	ID WTR (ft)	SITE DESC	RIPTION	BR. C	ON -L-	OVER	NORFOLK	SOUTHE	ERN RR @) -L- STA. 35	+23					GROUND V	NTR (ft)
BOR	ING NO. EB2-	-B	ST	TATION 36	6+20		OFFSET	40 ft RT		ALIGNMENT -L-		0 HR.	N/A	BORING NO). EB2-	В		ST	ATION 36	6+20		OFFSET 4	40 ft RT		Α	LIGNMENT -L-		0 HR.	N/A
COL	LAR ELEV. 1	25.2 ft	TO	OTAL DEPT	TH 94.1 ft	:	NORTHIN	3 476,48	30	EASTING 2,035,18	7	24 HR.	FIAD	COLLAR E	. EV . 12	25.2 ft		то	TAL DEPT	H 94.1 f	t	NORTHING	476,4	180	E	ASTING 2,035,187	2	4 HR.	FIAD
DRILI	. RIG/HAMMER E	FF./DATE SI	/IE R-2 D	IEDRICH D-5	0 84% 11/01	1/2009		DRILL N	ETHOD 1	Mud Rotary	HAMN	MER TYPE	Automatic	DRILL RIG/HA	MMER EF	F./DATE	SME	R-2 DI	IEDRICH D-5	0 84% 11/0	1/2009		DRILL I	METHO	D Mud Rot	tary	HAMMER	TYPE Aut	tomatic
	LER Contract			ART DATE	E 04/28/1	4	COMP. DA			SURFACE WATER I	EPTH N	/A		DRILLER					ART DATE			COMP. DA			SI	URFACE WATER DEPT	TH N/A		
ELEV (ft)	DRIVE ELEV (ft) DEPTI	0.5ft 0.5f	OUNT t 0.5ft	0 2		PER FOOT	75 100	SAMP. NO.	'/ 0	SOIL AND ELEV. (ft)	ROCK DES	SCRIPTION	DEPTH (ft)	ELEV DRIVE ELEV (ft)	DEPTH (ft)	0.5ft	0.5ft		0 2		PER FOOT	Γ 75 100	SAMP NO.	1 /	O G	SOIL AND ROC	CK DESCR	IPTION	
130										_				_50	<u> </u>					Mato	ch Line			<u> </u>		——— GRAY, SILTY S	SAND (cor		
125	1010					_					UND SURF		0.0	47.6 45	77.6	11	14	20		34				Sat.			(11	,	
	124.6 + 0.6 122.6 + 2.6	4 6		11					М		PAVEMENT AY EMBAN TY SAND	KMENT			82.6	12	18	30						w	44.2	2GRAY, SA	ANDY CLA	Ϋ	81.0
120	117.6 + 7.6			1 1 : :				_		- - -	SAND			40	87.6						\\`				39.2	2	SIETY SANI	<u>.</u>	86.0
115	+	4 6	6	• • 12 ·				-	M	- - -				35	+ 87.0	15	25	30			55			Sat.	- - - 34.2	2			91.0
140	112.6 + 12.6	5 6	6	• 12					м	- - - -				32.6	92.6	17	30	38			1			w	31.	1	ANDY CLA		94.1
110	107.6 + 17.6	2 5	7	:::::::::::::::::::::::::::::::::::::::				-	M M	109.2			16.0		 										-	Boring Terminated HARD SA	i at Elevatio ANDY CLA	in 31.1 π IN .Y	
105	 		'	• 12				SS-50	M						-										[
100	102.6 + 22.6	2 3	6	9 -					M				26.0		‡														
	97.6 + 27.6	6 6	8	- \					M	<u>.</u> ∔			20.0		† †														
95	92.6 + 32.6	3 4	6	: ;; : :				-		: ⊢94.2	ED COAST	AL PLAIN (SAND WI	<u>31</u> . <u>0</u> TH		+										-				
90	+			10				-	M	TRA	CE ORGAI	NICS			‡ ‡										[-				
85	87.6 + 37.6	5 5	5	10					Sat.	- - - -					‡														
OT.GDT	82.6 + 42.6	10 10	20		30				Sat.	- - - 81.2		a	44.0_		‡														
S.	77.6 + 47.6	40 40	24		:::			-		79.2 — — — — — — — — — — — — — — — — — — —	Y, SANDY O ASTAL PL 7, CLAYEY	AIN	<u>46.0</u>		+										-				
BORINGS.GPJ	+ +	12 19) 4			9 53		SS-51	Sat.	(CAPE I	EAR FORM	MATION)	51.0_		-														
	72.6 + 52.6	14 15	29		• • • • • • • • • • • • • • • • • • •	4			w		TT, OILTT C				‡														
98 65 0116 65 65 65 65 65 65 65 65 65 65 65 65 65	67.6 + 57.6	21 37	50				87		×						+														
<u> </u>	62.6 + 62.6					· //		-		64.2 GRA	Y, SILTY S	SAND	<u>61</u> . <u>0</u>		 														
В В4490 09 В	‡	9 17	26		\			_	Sat.	59.2	V	<u></u>	<u>66.0</u>		‡														
RE DOUBLE	57.6 + 67.6	12 18	35			53			w	GRA	Y, SANDY (CLAY			‡														
I BORI	52.6 + 72.6		26		:::/			1		54.2 GRA	Y, SILTY S	SAND	71.0		Ī										F				

PROJ. NO. -33727.1.1 ID NO. - B-4490 COUNTY -CUMBERLAND

EB1-A

			S	OIL 7	ΓE_{i}	ST	RE	SUI	LTS						
SAMPLE			DEPTH	AASHTO				% BY W	EGHT		% PAS	SING (S	EVES)	%	%
NO.	OFFSET	STATION	INTERVAL	CLASS.	LL.	ΡĮ	C SAND	FSAND	SLT	CLAY	10	40	200	MOSTURE	ORGANIC
SS-18	48 LT	34+32	17.5-19.0	A-2-6(0)	40	13	51.8	24.1	181	61	96	63	28	_	-
SS-19	48 LT	34+32	22.5-24.0	A-7-6(5)	43	15	20.7	39.8	31.4	81	100	89	49	_	_
SS-20	48 LT	34+32	32.5-34.0	A-6(2)	40	13	25.8	42.0	24.1	81	100	90	39	_	_
SS-21	48 LT	34+32	48 D-49 D	A-2-4(0)	33	NP	66 D	23.7	8.3	2.0	97	62	13	_	-

EB1-B

			S	OIL T	TE.	ST	RE	SUI	LTS						
SAMPLE			DEPTH	AASHTO		%	BYWEIG	HT		% PAS	SING (S	EVES)		%	%
NO.	OFFSET	STATION	I NTERVAL	CLASS.	LL.	ΡĮ	C SAND	F SAND	SLT	CLAY	10	40	200	MOSTURE	ORGANIC
SS-13	49RT	34+42	19.5–21.0	A-2-6(1)	40	15	43.3	26.4	193	11.0	93	71	32	_	_
SS-14	49RT	34+42	28 2-29 .7	A-7-6(7)	43	15	20.9	28 <i>9</i>	36.2	14.0	100	89	57	_	1
SS-15	49RT	34+42	43 2-44.7	A-7-6(9)	44	15	8.8	36.5	38.6	16.0	100	96	66	_	ı
SS-16	49 RT	34+42	53.2-54.7	A-2-4(0)	40	NP	56.3	30.4	9.3	4.0	99	72	16	-	-

EB2-A

LDB-M															
			S	OIL 7	TE.	ST	RE	SUI	LTS						
SAMPLE			DEPTH	AASHTO		ે	BYWEIG	HT		% PAS	SING (S	EVES)		%	%
NO.	OFFSET	STATION	I NTERVAL	CLASS.	LL.	ΡŢ	C SAND	F.SAND	SLT	CLAY	10	40	200	MOSTURE	ORGANIC
SS-22	60 LT	36+00	25-4.0	A-4(2)	25	9	23.6	29.8	28.3	18.3	100	87	52	-	3.8
SS-23	60 LT	36+00	75-9.0	A-2-6(0)	35	13	47.3	28.8	15.7	81	85	58	24	-	-
SS-24	60 LT	36+00	18.0-19.0	A-7-5(10)	46	16	7.5	39.4	45 D	81	100	97	64	-	_
SS-25	60 LT	36+00	27 5-29 0	A-7-6(4)	46	20	44.8	16.4	25.6	13.2	97	64	40	_	_
SS-26	60 LT	36+00	37.5-39.0	A-2-4(0)	31	9	32.9	41.2	18.8	71	100	92	32	_	_

EB2-B

			\boldsymbol{S}	OIL 7	TE:	ST	RE	SUI	LTS						
SAMPLE															
NO.	OFFSET	STATION	I NTERVAL	CLASS.	LL.	ΡĮ	C SAND	FSAND	SLT	CLAY	10	40	200	MOSTURE	ORGANIC
SS-50	40RT	36+20	17.6-19.1	A-2-7(2)	45	23	34 D	36.0	15	28.5	99	79	32	-	ı
SS-51	40RT	36+20	47.6-49.1	A-2-6(1)	37	15	51 D	22.4	165	102	97	72	29	_	1
SS-52	40RT	36+20	72.6-74.1	A-2-4(0)	32	8	28.9	48.2	16.8	61	100	88	29	-	-

